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SPECIALIZED INFORMATION SERVICES

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The Toxicology and Environmental Health Information Program (TEHIP), known originally as the Toxicology Information Program, was established more than 30 years ago within the National Library of Medicine in the Division of Specialized Information Services (SIS). Over the years TEHIP has evolved to provide for the increasing need for toxicological and environmental health information, taking advantage of new computer and communication technologies to provide more rapid access to a wider audience. Our development of novel search capabilities means that users need not have extensive knowledge or searching techniques and thus allows data to be relayed to them more effectively. Finally, we have moved beyond the bounds of the physical National Library of Medicine, exploring ways to point and link users to relevant sources of toxicological and environmental health information wherever these sources may reside. This is being accomplished primarily through the TEHIP and AIDS Web sites developed and maintained by SIS. Development of HIV/AIDS information resources became a focus of the Division several years ago, and now includes several collaborative efforts in information resource development and deployment. Continuous refinements and additions to our Web-based systems are made to allow easy access to the wide range of information collected by this Division. Our usage has continued to increase over the past year with access to all toxicology and HIV/AIDS data free over the Internet.

In FY 2000 SIS reexamined the scope and coverage of current programs, selecting several for significant re-engineering. We proposed new opportunities to enhance SIS information services and provide new services in emerging areas. This examination has been guided in the past by two Institute of Medicine (IOM) reports focusing on the TEHIP Program: *Toxicology and Environmental Health Information Resources: the Role of the National Library of Medicine*, released in the Spring of 1997, and a follow-on report, *Internet Access to the NLM's Toxicology and Environmental Health Databases,* published in 1999. Both reports have been instrumental in our re-engineering efforts, and were used as starting points for internal staff discussions at a strategic planning retreat held in April 2000.

RESOURCE BUILDING

The wide range of resources related to toxicology and environmental health information and HIV/AIDS information include many databases that are created or acquired as well as other services and projects.

The **Hazardous Substances Data Bank (HSDB)** continues to be a highly used resource, averaging over 25,000 searches each month. Increased emphasis continues to be placed on providing more data on human toxicology and clinical medicine within HSDB, in keeping with past recommendations of the Board of Regents' Subcommittee on TEHIP. The selection of new members of the Scientific Review Panel (SRP) for HSDB reflects this shift in content emphasis. Newer sources of relevant data are being examined for incorporation into new and existing data fields within the current 4,550 HSDB records. Because of increased staff efforts, more records

are being processed through special enhancements, including source updates from various peer-reviewed files. The process of developing a new Web-based system for HSDB creation, review, and maintenance has begun. An initial workshop to define some of the issues related to this re-engineering effort will be held in October 2000.

CHEMID (Chemical Identification File) is an NLM online chemical dictionary, which contains over 350,000 records, primarily describing chemicals of biomedical and regulatory importance. It is available to users through Internet Grateful Med, and also on the Web as the ChemIDplus file. ChemIDplus has additional features, including chemical structure search and display for 68,000 chemicals, and hyperlinked Locators that retrieve data for a given chemical from other resources such as MEDLINE or HSDB. Over 15,000 records of regulatory interest collectively known as SUPERLIST are also available and hyperlinked in ChemIDplus. During FY2000, an online Web maintenance system was developed for ChemIDplus, allowing individual record correction and addition to this resource. A prototype batch system was also developed to allow multiple record corrections. Chemical structure addition and maintenance is done in a method that also allows immediate updating. Over 12,000 structures were added to ChemIDplus in FY2001.

TOXLINE (Toxicology Information On-line) is a large NLM bibliographic database traditionally produced by merging "toxicology" subsets from some eighteen secondary sources. By the end of FY2000, the database included nearly 3 million citations to toxicology literature going back to 1965. In FY2000, we began the transition to a next generation TOXLINE, reducing the components needed to produce the database by creating a toxicology subset on NLM's PubMed so that users can access standard journal literature in toxicology and environmental health as part of an enlarging MEDLINE database. We are in the process of adding additional journals in the area of toxicology and environmental health to MEDLINE to cover some of the literature formerly provided by outside sources. For the non-standard journal literature in this area we are creating a Web-based system on TOXNET that will allow efficient acquisition and updating of these components. The next generation TOXLINE will be available to users on distributed systems, with an integrated approach provided by the new NLM Gateway and new features of the TOXNET search system.

DIRLINE (Directory of Information Resources On-line) is NLM's on-line directory of resources including organizations, databases, bulletin boards, as well as projects and programs with special biomedical subject focus. These resources provide information to users, which may not be available from one of the other NLM bibliographic or factual databases.

DIRLINE continues to receive a high level of use through a new interface, which became public in October 1999. This new interface supports direct links to the Web sites of the organizations listed in the database, as well as direct e-mail connections. Providing direct links for users facilitates ease of access for consumers as well as for health professionals. The quality and utility of the database continues to improve as duplicates have been eliminated through changes in policy and streamlining of maintenance. *Health Hotlines*, the always popular publication of health-related toll-free telephone numbers, has a Web version which also indicates the availability of Spanish-speaking customer service representatives and Spanish language publications from the resources listed.

The **Toxic Chemical Release Inventory (TRI)** series of files now includes four on-line files, TRI95 through TRI98. These files remain an important resource for environmental release data and are a useful complement to our other databases. Mandated by the Emergency Planning and Community Right-to-Know Act (Title III of the Superfund Amendments and Reauthorization Act of 1986), these EPA databases contain data on environmental release data to air, water, and soil for over 600 EPA-specified chemicals.

The **Chemical Carcinogenesis Research Information System** (CCRIS) continues to be built, maintained, and made publicly accessible at NLM. This data bank is supported by the National Cancer Institute (NCI) and has grown to over 8,000 records. The chemical-specific data covers the areas of carcinogenesis, mutagenesis, tumor promotion and tumor inhibition.

The **Integrated Risk Information System** (IRIS), EPA's official health risk assessment file, continues to experience high usage and be very popular with the user community. EPA has had a version of IRIS on the agency's Web page since 1996, and as we move to Web access we will consider how best to integrate our Web service with what EPA provides. IRIS now contains 535 chemicals.

The **GENE-TOX** file continues to be built and updated directly on TOXNET by EPA scientific staff. This file contains peer-reviewed genetic toxicology (mutagenicity) studies for about 3,200 chemicals. GENE-TOX receives a high level of interest among users in other countries.

The **Registry of Toxic Effects of Chemical Substances** (RTECS) is a data bank based upon a National Institute for Occupational Safety and Health (NIOSH) file by the same name which NLM restructured and made available for on-line searching. With our move to free Internet access to all databases, NIOSH requested that we no longer include RTECS on our system. We continue to use RTECS in the creation of the Hazardous Substance Data Bank.

The **Developmental and Reproductive Toxicology** (DART) database now contains over 46,000 citations from literature published since 1989 on agents that may cause birth defects. DART is a continuation of the Environmental Teratology Information Center backfile (ETICBACK) database, which contains almost 50,000 citations to literature published from 1950-1989. DART is funded by NLM, the Environmental Protection Agency, the National Institute of Environmental Health Sciences and the FDA's National Center for Toxicological Research and is managed by NLM.

The **Environmental Mutagen Information Center** (EMIC) database contains over 24,000 citations to literature on agents that have been tested for genotoxic activity. A backfile for EMIC (EMICBACK) contains over 75,000 citations to the literature published from 1950-1991. The Environmental Protection Agency, the National Institute of Environmental Health Sciences and NLM, collaborating partners in this effort, decided to stop compiling this special collection as of December 1999.

RESOURCE ACCESS

The SIS Web server provides a central point of access for the varied programs, activities, and services of the Division. Through this server (http://sis.nlm.nih.gov) users can access interactive retrieval services in toxicology and environmental health or HIV/AIDS information, find program descriptions and documentation, or be connected to outside related resources. During FY2000, we continued to a redesign the SIS Web site (http://sis.nlm.nih.gov), which now incorporates information about SIS in general, as well as toxicology and environmental health (http://sis.nlm.nih.gov/tehip.htm) and AIDS information (http://sis.nlm.nih.gov/hiv.htm). Both the toxicology and environmental health and AIDS web pages provide links to NLM outreach activities in these subjects, access to NLM databases, links to selected web sites in these subjects, as well as tutorials, fact sheets, and other publications produced by SIS. Over 8,000 users visit the SIS Web site weekly and view approximately 50,000 pages.

Toxicology Data Network (TOXNET)

The **Toxicology Data Network (TOXNET)**, NLM's computer system providing data bank building for many of its toxicology files, has moved from a networked microprocessor environment to a UNIX-based platform (Solaris Version 2.6) on a SUN Enterprise 3000 computer. Integration of this configuration with other SIS database creation systems and the Web access to them is currently underway.

In FY2000, SIS continued the development of the new search interface to access all of the SIS toxicology and environmental health databases. This new search interface (http://toxnet.nlm.nih.gov) allows users to easily search HSDB, TOXLINE, CCRIS, Gene-Tox, DART, EMIC, IRIS, and TRI. Based on recommendations from the IOM, users are presented with a basic search screen with just a single input box for searching, with customized screens for more sophisticated users. These advanced features include Boolean searching and the ability to limit search terms to specific fields. By the middle of FY2000 this access became the only access for users to the TOXNET data banks, replacing an earlier Internet access. Plans are underway to allow the new NLM Gateway to provide access to the TOXNET search system as well, making it easier for new users to learn about our resources.

Internet Grateful Med (IGM)

Near the end of FY98 access to TOXLINE and ChemID was added to **IGM,** where access to DIRLINE, the HIV/AIDS databases, MEDLINE, and many other NLM databases was already being provided. This route of access will be discontinued during FY2001, when the Elhill versions of TOXLINE and ChemID are terminated as part of NLM’s transition from mainframe legacy systems.

Chemical Structure Server

The chemical structure server has evolved from a mechanism to provide structure searching for chemicals covered by SIS databases to a system for integrating chemical dictionary record building and structure searching. This system uses special molecular searching programs

and includes a prototype database for construction of ChemID records. The chemical information resources continue to be consolidated on a server (http:// chem.sis.nlm.nih.gov) that meets the requirements for chemical structure creation and access.

AIDS Information Services

NLM has continued to refine its HIV/AIDS information services and make them more available to a wider audience. SIS staff led the development of the HIV/AIDS topic page on Medlineplus, identifying and organizing resources of specific interest to consumers. This page is a valuable addition to the NLM AIDS home page (http://sis.nlm.nih.gov/hiv.htm) which contains information about NLM's programs, access to the HIV/AIDS-related databases, and links to selected HIV/AIDS resources of a more technical nature.

NLM has continued its successful AIDS Community Outreach Program with sixteen awards in FY 2000, bringing the total number of awards made under this program to 124. This year five awards were made to enable previous recipients to expand or continue their projects. NLM-funded projects have ranged from the simple purchase of hardware and services to support a widely acclaimed Web site (AEGIS), to the development of low literacy treatment fact sheets in English and Spanish, to supporting a computer resource room in a public housing project.

At the request of our partner PHS agencies, NLM has continued its project management of the AIDS Clinical Trials Information Service (ACTIS) and the HIV/AIDS Treatment Information Service (ATIS). NLM has been a partner in these projects since their inception, but now has increased responsibility. The ACTIS databases, AIDSTRIALS and AIDSDRUGS, are available through Internet Grateful Med, as well as on the Web (http://www.actis.org). The federally sponsored HIV-related treatment guidelines are also available in multiple formats on the Web (http://www.hivatis.org) and in the HSTAT database.

NLM has provided training in the use of HIV/AIDS resources to a number of different audiences. In addition to teaching the use of NLM's online resources, this training includes identification and selection of high-quality, accurate resources, as well as a discussion of the most valuable of those resources. NLM works with a number of minority organizations including the National AIDS Minority Information and Education Program (NAMIE) to provide training at regional and other meetings. In addition, NLM continues to provide training at a variety of HBCU/MI's to faculty, staff, and members of the local community.

OUTREACH / USER SUPPORT

SIS continues its support of the Toxicology Information Outreach Project. The objective of this initiative is to strengthen the capacity of Historically Black Colleges and Universities (HBCUs) to train medical and other health professionals in the use of NLM's toxicological, environmental, occupational health and hazardous wastes information resources. In addition to providing workstations, training and free on-line access to HBCUs participating in a training development project, NLM has collaborated with the Agency for Toxic Substances and Disease Registry (ATSDR) to train representatives from additional schools in the use of NLM's valuable

on-line resources. This year the TIOP meeting was held in New Orleans, LA, in conjunction with the meeting of the American Association of Pharmaceutical Scientists. The meeting focused on how TIOP and its member schools could assist NLM in implementing its long-range plan.

Classes with specific user group focus have been conducted in addition to our usual NLM-based training. These include training sessions held at the annual Rural Minority Health Conference and at the Environmental Justice Resource Center at Clark Atlanta University.

Another outreach effort focusing on improvement of access to health and disaster information in Nicaragua and Honduras was begun in FY2000. This project includes several components, including the development of technological infrastructure and Web site enhancement.

User Support Computer-Based Activities

SIS has developed a set of Internet tutorials, TOXICOLOGY *TUTORS*, which are introductory level toxicology courses available on the SIS Web server. We are considering appropriate additions to this collection for development in the future.

Other new avenues of user support are being focused at the consumer level, with a collaborative development of MEDLINE*plus* topics and addition of other special topics of concern to the general public to the SIS Web site.

Alternatives to Animal Testing

SIS continued to compile and publish references from the MEDLARS files that were identified as relevant to methods or procedures which could be used to reduce, refine, or replace animals in biomedical research and toxicological testing. Requests for these quarterly bibliographies have increased, as has the number of articles deemed relevant to the field. Bibliographies issued during the past four years are available on the Internet through the SIS Web Server, and the primary distribution mechanism for this project is now the Internet.

Other Specialized Services

In addition to toxicologic data files, SIS is evaluating other areas for creating specialized factual and bibliographic databases. Resource allocations are being made to determine the feasibility of initiating more clinical medicine information products for public, health professional, and scientific audiences. One area that SIS is beginning to focus attention on is drug information. SIS has begun a critical review of its role in organizing and disseminating drug information in various formats, exploring a role in the assessment of the integrity and

validity of such information. Another new project is exploring the use of a symptom and occupation based clinical medicine resource appropriate for use on the Web. Yet another initiative is examining the utility of a Web resource for consumers that links brand name household products with their ingredient chemicals and potential adverse health effects.

In these and other new initiatives, SIS continues to search for new ways to be responsive to user needs in acquiring and using toxicology and environmental health and HIV/AIDS information resources.